

WHAT IS CLAIMED IS:

- 1 1. A beam control processor for use with a transceiver employing an inertial sensor and  
2 capable of transmitting a laser beam to an other transceiver, comprising:  
3 a line-of-sight estimation subsystem configured to provide a line-of-sight pointing vector  
4 of said laser beam based on acceleration inertial motion data provided by said inertial sensor; and  
5 a line-of-sight control subsystem configured to generate beam steering commands for  
6 said transceiver as a function of said line-of-sight pointing vector.
- 1 2. The beam control processor as recited in Claim 1 wherein said line-of-sight estimation  
2 subsystem is configured to provide said line-of-sight pointing vector of said laser beam based on  
3 receiver orientation feedback data and transmit position feedback data associated with said  
4 transceiver.
- 1 3. The beam control processor as recited in Claim 1 further comprising a coordinate  
2 transform subsystem configured to provide line-of-sight data about said other transceiver based  
3 on outer control loop data including a line-of-sight pointing data and an inertial motion of said  
4 other transceiver.
- 1 4. The beam control processor as recited in Claim 3 further comprising a relative line-of-  
2 sight estimation subsystem configured to provide line-of-sight commands based on said line-of-  
3 sight data about said other transceiver and said line-of-sight pointing vector associated with said  
4 transceiver.

1    5.        The beam control processor as recited in Claim 4 wherein said line-of-sight control  
2    subsystem is configured to provide said beam steering commands based on said line-of-sight  
3    commands and a beam center error associated with said other transceiver.

1    6.        The beam control processor as recited in Claim 1 further comprising a residual beam  
2    centering error subsystem configured to provide outer control loop data based on line-of-sight  
3    data and a beam centering error of said transceiver.

1    7.        The beam control processor as recited in Claim 1 wherein said line-of-sight control  
2    subsystem is configured to provide receiver orientation commands as a function of said line-of-  
3    sight pointing vector.

1 8. A method of providing beam steering commands for use with a transceiver employing an  
2 inertial sensor and capable of transmitting a laser beam to an other transceiver, comprising:  
3 providing a line-of-sight pointing vector of said laser beam based on acceleration inertial  
4 motion data provided by said inertial sensor; and  
5 generating beam steering commands for said transceiver as a function of said line-of-  
6 sight pointing vector.

1 9. The method as recited in Claim 8 wherein said providing said line-of-sight pointing  
2 vector of said laser beam is based on receiver orientation feedback data and transmit position  
3 feedback data associated with said transceiver.

1 10. The method as recited in Claim 8 further comprising providing line-of-sight data about  
2 said other transceiver based on outer control loop data including a line-of-sight pointing data and  
3 an inertial motion of said other transceiver.

1 11. The method as recited in Claim 10 further comprising providing line-of-sight commands  
2 based on said line-of-sight data about said other transceiver and said line-of-sight pointing vector  
3 associated with said transceiver.

1 12. The method as recited in Claim 11 wherein said generating said beam steering commands  
2 is based on said line-of-sight commands and a beam center error associated with said other  
3 transceiver.

1 13. The method as recited in Claim 8 further comprising providing outer control loop data  
2 based on line-of-sight data and a beam centering error of said transceiver.

1 14. The method as recited in Claim 8 further comprising generating receiver orientation  
2 commands as a function of said line-of-sight pointing vector.

1 15. A transceiver, comprising:  
2 a housing that provides a foundation for said transceiver;  
3 an inertial sensor, coupled to said housing, configured to provide acceleration inertial  
4 motion data associated with said transceiver;  
5 a transmitter element configured to transmit a transmitted laser beam to an other  
6 transceiver;  
7 a receiver element configured to receive a received laser beam from an other transceiver;  
8 and  
9 a control processor, coupled to said transmitter and receiver elements, configured to  
10 provide beam steering control for said transmitter element and orientation control for said  
11 receiver element, including:  
12 a beam control processor, including:  
13 a line-of-sight estimation subsystem configured to provide a line-of-sight pointing  
14 vector of said transmitted laser beam based on acceleration inertial motion data provided by said  
15 inertial sensor, and  
16 a line-of-sight control subsystem configured to generate beam steering commands  
17 for said transmitter element as a function of said line-of-sight pointing vector.

1 16. The transceiver as recited in Claim 15 wherein said line-of-sight estimation subsystem is  
2 configured to provide said line-of-sight pointing vector of said transmitted laser beam based on  
3 receiver orientation feedback data and transmit position feedback data associated with said  
4 transceiver.

1 17. The transceiver as recited in Claim 15 wherein said beam control processor further  
2 comprises a coordinate transform subsystem configured to provide line-of-sight data about said  
3 other transceiver based on outer control loop data including a line-of-sight pointing data and an  
4 inertial motion of said other transceiver.

1 18. The transceiver as recited in Claim 17 wherein said beam control processor further  
2 comprises a relative line-of-sight estimation subsystem configured to provide line-of-sight  
3 commands based on said line-of-sight data about said other transceiver and said line-of-sight  
4 pointing vector associated with said transceiver.

1 19. The transceiver as recited in Claim 18 wherein said line-of-sight control subsystem is  
2 configured to provide said beam steering commands based on said line-of-sight commands and a  
3 beam center error associated with said other transceiver.

1 20. The transceiver as recited in Claim 15 wherein said beam control processor further  
2 comprises a residual beam centering error subsystem configured to provide outer control loop  
3 data based on line-of-sight data and a beam centering error of said transceiver.

1 21. The transceiver as recited in Claim 15 wherein said line-of-sight control subsystem is  
2 configured to provide receiver orientation commands as a function of said line-of-sight pointing  
3 vector.